



Elevation is Not Enough: Utilizing Smart Building Practices

Full Mitigation Best Practice Story

Saint Tammany Parish, Louisiana

Slidell, LA – Everett and Carol Brugier heeded the call to evacuate before Hurricane Katrina struck Louisiana. Their house in Pirates Cove in Slidell suffered only minor damage, thanks to several special hurricane-resistant features built into it.



The Brugiers own a home in Mandeville, Louisiana, but wanted a residence closer to the marina where they kept their boat. The Slidell area is considered to be at high risk for hurricanes, and the Brugiers knew that they would have to elevate their home to avoid flood damage as well as incorporate wind-resistant features into its construction. Their scenic view of Lake Pontchartrain, which lies about a quarter of a mile from their deck, comes with a drawback. Pirates Cove is in a V-Zone within a Special Flood Hazard Area, as designated by the National Flood Insurance Program. V-Zones are coastal areas subject to the additional hazard associated with storm-induced velocity wave action. The design of the Brugier home had to be reviewed and the plans approved by a licensed architect before they could obtain a building permit from St. Tammany Parish.

After obtaining a building permit, the Brugiers built their home with the assistance of a contractor from nearby Lacombe. “He knows his stuff and knows how to build well,” said Mr. Brugier. The local building code requires homes in Pirates Cove to be elevated to 13 feet above sea level, which is four feet above the Base Flood Elevation, the average floodwater depth for a 100-year flood event. The Brugiers chose to elevate their home to 16.4 feet, which provided enough height to park their motor home underneath the house. The additional height prevented several feet of water from reaching into their living level during the 2005 hurricane season.

Because their house was within close proximity to Lake Pontchartrain, erosion of the soil from hurricane-induced waves was a serious concern. Therefore, before the home elevation could begin, a bulkhead had to be constructed, which created a buffer between the waves and the soil. The bulkhead was comprised of vinyl panels, which were driven into the ground, and a thick concrete slab. Because of the weak bearing strength of the soil, Mr. Laurent chose to place the structural slab on wooden piles and backfill them with an artificial fill that provided a suitable bearing strength. The piles were embedded 15 feet into the ground. The contractor then poured the concrete to form the structural slab that would support the elevated house.

The Brugiers’ house incorporated several hurricane-resistant features. The house was supported on reinforced concrete block columns. The reinforcement was embedded 24 inches into the structural slab, and extended the full height of the column. Horizontal wooden beams consisting of two-inch by 12-inch members rested on top of the columns and provided the framework for support. The walls of the house were framed with two-inch by two-inch members. The foundation-to-floor and wall-to-roof connections were strengthened with hurricane clips, which are designed to maintain the integrity of the connection during very high winds. Windows, whose style and placement are also critical to preventing hurricane damage, also met the parish’s building code requirements. Another feature of the Brugiers’ house was breakaway walls, which are designed to disconnect from the house in the event of storm surge. These breakaway walls not only mitigate further damage, but can also be designed to be aesthetically pleasing elements of a house. The Brugiers moved into their new home in November 2004.

The incorporation of hurricane-resistant features (beyond the basic elevation of the structure) into the Brugiers’ house increased construction costs by an estimated \$12,000, but they consider it a worthwhile investment, especially after the 2005 hurricane season. Although the floodwaters beneath their home rose to 15 feet, within about one and a half feet of the floor joists, the breakaway walls survived intact, no water entered the home, and the roof was not damaged. Damage was limited to the loss of the gutters on the northeast side of the house and to the air-conditioning unit, which was above the floodwater but not securely fastened to its platform.

The Brugiers’ neighbors, some full-time residents and some “weekenders,” did not fare as well. “I came out a lot better than my neighbors. There was extensive water damage on either side of me and most of the other houses in my area were badly affected,” said Mr. Brugier. “The water first came in from the east, got into Lake Pontchartrain, and then came back from the west across the levee.” He stated that there were 40-foot boats on top of some houses, and other houses were blown two or three miles out into the marsh to the east of the highway. The Brugiers did not carry flood insurance before the 2005 storms and did not believe that many of their neighbors did either, but the Brugiers plan to purchase a policy for the future.

Mr. Brugier offers the following advice to homeowners who plan to build in areas of high flood risk: "Get it up in the air and build it strong! It just makes sense to use good building practices when you know you're going to get a hurricane at least every other year."

Activity/Project Location

Geographical Area: **Single County in a State**

FEMA Region: **Region VI**

State: **Louisiana**

County: **Saint Tammany Parish**

City/Community: **Slidell**

Key Activity/Project Information

Sector: **Private**

Hazard Type: **Hurricane/Tropical Storm**

Activity/Project Type: **Building Codes; Elevation, Structural**

Structure Type: **Concrete, Reinforced**

Activity/Project Start Date: **02/2004**

Activity/Project End Date: **11/2004**

Funding Source: **Homeowner**

Activity/Project Economic Analysis

Cost: **Amount Not Available**

Activity/Project Disaster Information

Mitigation Resulted From Federal
Disaster? **No**

Value Tested By Disaster? **Yes**

Tested By Federal Disaster #: **No Federal Disaster specified**

Year First Tested: **2005**

Repetitive Loss Property? **No**

Reference URLs

Reference URL 1: http://www.fema.gov/rebuild/mat/mat_fema499.shtm

Reference URL 2: <http://www.floodsmart.gov>

Main Points

- The Brugiers' home in Pirates Cove in Slidell withstood the winds and waters of the 2005 hurricane season.
- The Brugiers chose to elevate their home to 16.4 feet and incorporate several hurricane-resistant features into its construction.
- Although the floodwaters beneath their house rose to 15 feet (within about one and a half feet of the floor joists), the breakaway walls survived intact, no water entered the home, and the roof was not damaged.
- Everett Brugier declared "Get it up in the air and build it strong! It just makes sense to use good building practices when you know you're going to get a hurricane at least every other year."



Everett and Carol Brugier's elevated home, with hurricane debris in the foreground.



Concrete column supports beneath the Brugiers' elevated home.